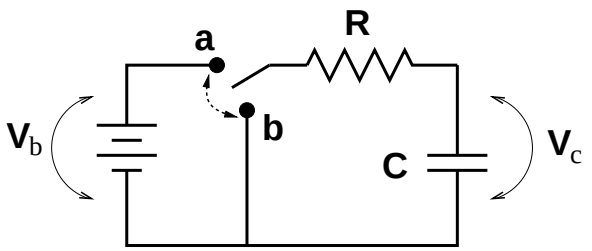
Pratt, Scott **Section 999**

–Introductory Physics II - EXAM 2 - Mar. 3, 1998

CAPA ID is **9160**



1. [3pt] After being in position a for a long time the switch is changed to position b at time $t = 0$. If the voltage across the capacitor at $t = 2.5\ s$ is $V_c = .50V$, what was the voltage of the battery in volts?
DATA: C =27.5 $\times 10^{-3} F$. $R = 100\ \Omega$.

A) 4.25×10^{-1} B) 4.80×10^{-1} C) 5.43×10^{-1} D) 6.13×10^{-1}
E) 6.93×10^{-1} F) 7.83×10^{-1} G) 8.85×10^{-1} H) 1.24

---

2. [3pt] Consider a proton moving with a velocity $v = 2.80 \times 10^6\ m/s$ perpendicular to a uniform magnetic field $B = 1.10\ T$. What is the radius (in m) of the proton's circular orbit? DATA: $m_p = 1.67 \times 10^{-27} kg$.

A) 1.42×10^{-2} B) 1.66×10^{-2} C) 1.94×10^{-2} D) 2.27×10^{-2}
E) 2.65×10^{-2} F) 3.10×10^{-2} G) 3.63×10^{-2} H) 4.25×10^{-2}

---

3. [3pt] A long cylindrical solenoid of length ℓ has N turns and carries a steady current I. Which of the following statements are true? (Give ALL correct answers)

A) If N is doubled while ℓ and I stay constant, the magnetic field inside the solenoid doubles.

B) Inside the solenoid, the magnetic field is directed along the axis of the solenoid.

C) If the current is doubled the magnetic field inside the solenoid doubles.

---

4. [3pt] A long straight wire carries a current I. (For each statement select T True, F False).

A) If one doubles the current the magnetic field at any point doubles.

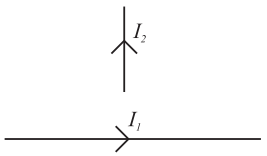
B) At any point the magnetic field is directed directly TOWARD the wire.

C) The observed magnetic field falls by a factor of one fourth when the distance from the wire is doubled.

---

5. [3pt] A circular loop (radius $r = 0.021\ m$) has a resistance $R = 13.0\ \Omega$. A magnetic field, directed perpendicular to the loop, rises from zero to 0.13 T in 0.025 s. What is the average induced current (in A) during that time?

A) 3.82×10^{-4} B) 5.54×10^{-4} C) 8.04×10^{-4} D) 1.17×10^{-3}
E) 1.69×10^{-3} F) 2.45×10^{-3} G) 3.55×10^{-3} H) 5.15×10^{-3}



6. [3pt] Two wires carry currents in the directions shown. The magnetic field produced by the long wire (I_1) causes a force on the short wire (I_2) that... (only one answer is correct.)

A) points into the page.

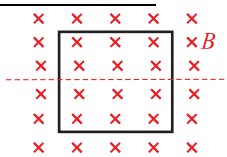
B) points toward the long wire.

C) points out from the page.

D) points to the right.

E) is zero.

F) points to the left.

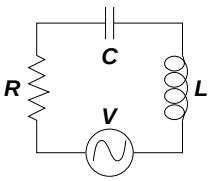


7. [3pt] Consider the square wire loop shown above. A magnetic field is directed into the page. (For each statement select T True, F False).

A) Rotating the coil (about the dotted axis) at a high frequency in a constant field will generate stronger currents than rotating the coil at a lower frequency.

B) Quicly increasing the magnetic field induces a current in the loop.

C) Quickly decreasing the magnetic field induces a current in the loop.



8. [3pt] Regarding the diagram above, which of the following statements are true? (For each statement select T True, F False).

A) Energy is stored and released, but not dissipated, in both the capacitor and the inductor.

B) The current through the inductor equals the current through the resistor at any instant.

C) The frequency of the voltage across the inductor equals the frequency of the voltage across the resistor.

9. [3pt] Choose the value for the inductance L (in H) such that the above circuit carries the largest current. DATA: $R = 210\ \Omega$. $f = 1.93 \times 10^3\ Hz$. $C = 6.10 \times 10^{-3}\ F$. $V_{rms} = 75\ V$.

A) 8.14×10^{-7} B) 9.53×10^{-7} C) 1.11×10^{-6} D) 1.30×10^{-6}
E) 1.53×10^{-6} F) 1.79×10^{-6} G) 2.09×10^{-6} H) 2.44×10^{-6}

10. [3pt] Using the inductance found in the previous problem, what is the impedance (in Ω) seen by the voltage source?

A) 2.26×10^1 B) 3.28×10^1 C) 4.75×10^1 D) 6.89×10^1
E) 9.99×10^1 F) 1.45×10^2 G) 2.10×10^2 H) 3.04×10^2